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ABSTRACT

Environment-based education (EBE) focuses on the interdisciplinary integration of the subject by using constructivist, team teaching, self-learning, and student-centered instructional approaches. This report defines environment-based education and discusses advanced developments in learning skills and character education. Contents include: (1) "Introduction"; (2) "How Environment-Based Education Advances Learning Skills and Character Education"; (3) "Conclusion: A Dynamic Environment for Learning"; and (4) "Annotated Bibliography." The annotated bibliography lists 50 publications. (Contains 50 references.) (YDS)

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Using ENVIRONMENT-BASED Education to Advance Learning Skills and Character Development

A Report, Annotated Bibliography, and Research Guide

The North American Association for Environmental Education

The National Environmental Education & Training Foundation

OCTOBER 2001

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A Report, Annotated Bibliography, and Research Guide

The North American Association
for Environmental Education

The National Environmental
Education & Training Foundation

Washington, D.C.

OCTOBER 2001

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FOREWORD

Environment-Based Education for Lifelong Learning

This report describes the efficacy of environment-based education in helping young people become lifelong learners and leaders. It is a joint effort of The National Environmental Education & Training Foundation (NEETF) and The North American Association for Environmental Education (NAAEE). An earlier joint report discussed how environment-based education increases student achievement in science, mathematics, and reading, as measured by standardized test scores.

A well-rounded education, however, means more than just higher test scores and grade level achievement. Accordingly, this report looks at less tangible, but equally important, effects of environment-based education on our young people. These include: improved motivation, skills for life-long learning, career preparation, and attitudes of respect and responsibility.

The most recent annual public opinion survey of adult Americans conducted by Roper Starch for NEETF found that 95% of parents support environmental education (EE) in our schools. This support probably stems from a common perception that exposing a child to the wonders of nature, animals, and cleaner communities helps overcome apathy and teaches respect.

Environment-based education — using the environment as a tool for achieving broader educational goals — has the potential to dramatically increase the overall amount of time teachers spend on the environment each school year. Environment-based education is consistent with the EE goals of deeper understanding, investigation, and decision-making skills. The unquenchable enthusiasm that students bring to environmental subjects will only expand with further education and lead them to become effective environmental stewards, regardless of their place on the political spectrum.

We believe that parents and educators searching for ways to enliven our youth, engage them in their own education, involve them in the community, and help them achieve their full potential will gain useful insights from the following pages.

We would like to express our sincere appreciation to the many people — teachers, students, administrators, and educational researchers — who contributed their ideas and experiences to this report, particularly Edward McCrea, former Executive Director of NAAEE; the Office of Environmental Education at the United States Environmental Protection Agency for its generous support of printing and production; Joanne Lozar Glenn, who researched the material presented here; and Kevin Coyle, President of NEETF, for his invaluable contributions to both the substance and form of this report.

I. INTRODUCTION

What is Environment-Based Education?

The Environment and Education

A quiet revolution is taking place in many American schools. Forced by underperformance, or even failure, a number of schools have adopted a new approach based on understanding what interests children and what can transform them into active learners. With students engaged in learning, and with teachers who are motivated and fulfilled, these schools are experiencing a renaissance in more effective learning.

It is natural for human beings to be interested in the world around them. No one is surprised to see the curiosity of small children examining a worm or a flower, or asking why the sky is blue or the wind blows. Yet we put these same children into sterile, constricted environments and make them sit still and be quiet when their bodies and minds want to be engaged and active.

Many people think of environment-based education as "nature studies" — a supplement to the educational system, an activity that largely takes place outside of school hours and which relates only tangentially to the core curriculum. They need to look carefully at the broad range of benefits offered by environment-based education. America should not wait for schools to fail before taking a serious look at why students perform below their potential, why they misbehave in school, or why they get into trouble after school hours. Leaders in education and business must begin to inform America about the success of environment-based education not only to improve test scores, but also to produce young citizens who are prepared to take their place as adults in the complex and challenging society of the 21st century.

Defining Environment-Based Education

Over the past 30 years, the core field of environmental education has developed into one of the most effective paradigms of learning available today. Environmental education goes beyond providing students with simple information about environmental issues. As defined in the National Project for Excellence in Environmental Education (www.naaee.org/npeee):

> "Environmental education is a process that aims to develop an environmentally literate citizenry that can compete in our global economy; has the skills, knowledge, and inclinations to make well-informed choices; and exercises the rights and responsibilities of members of a community."

Professionally-executed environmental education (EE) is a comprehensive process for helping people understand the environment, their place in it, and related issues (Archie and McCrea, 1998). The main goal of EE is for people of all ages to know enough about envi-

ronmental science and related social issues to make sound and well-reasoned environmental decisions.

The term "environment-based education" (EBE) is used in this report to focus attention on the numerous benefits that arise from using the environment more broadly as a learning tool in schools and after-school programs. While environmental education focuses on building a base of environmental knowledge and skill to be applied to environmental stewardship, environment-based education uses a popular subject matter to improve students' learning skills and create a wider learning context for students, teachers, and the community. Environment-based education emphasizes interdisciplinary integration of subject matter, problem- and issue-based learning experiences, team teaching, learner-centered instruction, constructivist approaches, and self-directed learning. A similar term, "environment as an integrating context" (EIC) is used by the State Education and Environment Roundtable (SEER) to describe this approach (www.seer.org).

For students on the receiving end, there may be little difference in their experience of EE and EBE. In recent years, environmental education has become more comprehensive and oriented to active learning, problem-solving, decision-making, and understanding the complexities of interactions in the living and nonliving world (Stapp and Cox, 1974; UNESCO/UNEP, 1978; Hungerford, Peyton, and Wilke, 1980; Simmons, 1995; Stapp, Wals, and Stankorb, 1996; Hungerford et al., 1996).

Environment-based education has the potential to dramatically increase the amount of time teachers spend on the environment each school year. A recent study indicates that the average teacher spends fewer than 50 hours per year on environmental subjects (NAAEE and ELC, 2001). By making the environment more educationally relevant to teachers and students, the amount of exposure can be increased exponentially. Importantly, students have an extraordinary enthusiasm for environmental subjects, which if nurtured, will naturally lead them to become effective environmental stewards in addition to better learners.

Beyond stewardship, environmental-based learning has the potential to revitalize our nation's schools and to provide numerous side benefits to students, teachers, and communities that continue far beyond a student's tenure in school. This position paper reviews how broader adoption of environment-based education can help produce:

- high-performance lifelong learners
- effective future workers and problem solvers
- thoughtful community leaders and participants, and
- people who care about the people, creatures, and places around them.

A Response to "Standards"

Increasingly, deficiencies in U.S. education are addressed by establishing student achievement standards that demand higher levels of accountability and mandatory testing. In 1999, the North American Association for Environmental Education (NAAEE) released its own set of standards, *Excellence in Environmental Education — Guidelines for Learning (K-12)*. NAAEE correlated these standards with national standards for arts, sciences, civics and government, economics, language arts, geography, history, mathematics, science and social studies. Several states are engaged in similar efforts.

Environment-based education is a broad-based strategy for improving teaching and learning, but it has not been widely accepted as such, nor is it fully recognized as being use-

ful in bringing a student-centered approach to standards-based learning. In one recent examination of this question, Kearney (1999) finds that most teachers do not recognize all the educational improvement opportunities that environment-based studies routinely present. This could change as a growing body of evidence links environment-based education to improved test scores and grade level achievement. Klein (1995) and Volk and McBeth (1998) report that students who experience issues-based EE make significant cognitive and skill gains, with notable improvements in levels of measurable achievement. For example, students at Hawley Environmental Elementary School (Milwaukee, Wisconsin) exceeded the state average on both state tests and nationally-normed assessments, scoring higher than all other schools in Wisconsin with similar socio-economic status (U.S. Department of Education, 1999).

Environment-based education helps teachers meet standards across multiple disciplines within a single curriculum. EBE's emphasis on higher-order thinking has already been shown to increase academic achievement in reading, math, science, and social studies. Its focus on the immediate environment and the local community makes learning relevant, interesting, and compelling. When learners are engaged, both achievement and discipline improve, thus helping to create safer schools.

Value Added by Environment-Based Education

The idea that some fields of study yield incredible side benefits is not new in the field of education. For years, proponents of art and music education have been pointing to improved cognitive and problem solving skills as a reason to expand their program in the schools. Could it be that study of the environment may be similarly worthwhile?

Motivation plays a critical role in both learning and effective teaching. In a 1999 report, *Problem Solved: How to Coach Cognition,* Krynock and Robb find that students who perceive their studies as relevant to their lives are more highly motivated to learn. This has important implications for environment-based education. Environmental topics and projects hold a great deal of intrinsic interest for students, particularly when they are aimed close to home. They provide abundant opportunities for student-focused learning. It can make a real difference to a child to learn about a problem with a local creek or wetland or about neighborhood effects of recycling and conservation programs. For students engaged in environment-based studies, the abstract quickly becomes real through such immediate examples. As part of an overall educational development program, environment-based education plays an important role in helping students have a rounded education.

A number of recent studies have documented how young people benefit from environment-based education. A companion report to this one, *Environment-Based Education: Creating High Performance Schools and Students* (NEETF, 2000) provided case studies with anecdotal evidence as well as test score results for seven schools that have adopted EBE. The most comprehensive work in this area has been done by the State Education and Environment Roundtable (SEER), an organization formally advised by 12 state education departments (www.seer.org). Its 1998 study describes how 40 schools have reaped remarkable academic, attitudinal, and behavioral results by using the environment as an integrating strategy for applying science, mathematics, social studies and language arts concepts (Lieberman and Hoody, 1998).

The SEER study provides a useful benchmark for understanding the role of environment-based education in academic performance and educational reform. Importantly, enthusiasm and the desire to learn and teach increased in each of the schools studied. The SEER

study also found that student performance in each of the schools improved regardless of socio-economic factors.

Many of the schools in the SEER study turned to the environment as an integrator when other more conventional approaches had failed. A similar thing happened in 1995 at the Kramer Middle School in Washington, DC. With low test scores and student discipline, Kramer became known as a "problem school." Parents and teachers were skeptical that its problems could be reversed by becoming an environmental middle school. However, with a principal's leadership and a commitment from the community, student academic achievement improved and discipline problems diminished. Other schools have had similar experiences. Schools in trouble can — on their own — turn to the environment to achieve success.

It is the rare school that makes the level of commitment to environment-based integration that Kramer Middle School or the SEER study schools were able to make. Still, it is clear that any school can have a successful EIC program if school leaders and students are up to the challenge. Support from parents for environmental education is at an all-time high, receiving a remarkable 95% approval rating in a recent survey conducted by NEETF and Roper Starch Worldwide (NEETF, 2001). Parental attitudes, combined with the widespread recognition of the need for change, make this an outstanding time to bring the environment into the mainstream of K-12 education.

More Stimulating and Challenging After-School Programs

The hours of 2:00 pm to 8:00 p.m. are considered by police forces as peak hours of juvenile crime, violence, and mischief, according to a report by the U.S. Department of Education (1998). A poll taken at 1999 George Mason University, Alexandria, Virginia, in 1999 disclosed that a majority of police chiefs — 86 percent nationwide — agree that expanding after-school programs would greatly reduce youth crime and violence (Mastrofsky and Keeter, 1999).

When youth are occupied with constructive interests and skill development, youth crime rates drop dramatically. Acting on these findings, the U.S. Department of Education has sponsored a new program, 21st Century Community Learning Centers, which supports thousands of new after-school programs. In federal fiscal year 1997, Congress supported this program at $1 million. In fiscal year 2001 that support had increased to over $800 million.

Environment-based education programs are particularly well suited to after-school programs. The projects are of particular interest to young people. When asked which subjects interest them most for community service or service learning, students overwhelmingly choose the environment (82 percent) as one of their top three choices (Wirthlin Group, 1995).

Environment-based programs also interest and involve a wider circle of adults in young people's after-school care. In an article titled, "Gaining Control of Violence in Schools: A View from the Field," Ascher (1994) points to teacher isolation and cynicism as major factors contributing to school violence. The SEER study, *Closing the Achievement Gap* (Lieberman and Hoody, 1998), and other research indicate that environment-based programs can help reduce teacher isolation by involving parents, making connections with the community, and team teaching.

A majority of adults support after-school programs and early childhood education to reduce school violence. According to a Prudential Survey conducted in 1995 by the Wirthlin Group, 61 percent of adult Americans think that such programs would reduce youth violence in and out of schools.

Guidelines for Excellence

NAAEE's publication, *Environmental Education Materials: Guidelines for Excellence* (1996) outlines key characteristics of quality environmental education (EE) materials. These guidelines can help the educator, administrator, curriculum designer, or materials developer evaluate the quality of EE materials. They provide direction while allowing flexibility to shape content, technique, and other aspects of instruction. For each of the six basic principles outlined below, the NAAEE guidelines specify what to look for in EE materials and offer examples.

- **Fairness and accuracy:** EE materials should be fair and accurate in describing environmental problems, issues and conditions, and in reflecting the diversity of perspectives on them.
- **Knowledge presented in depth:** EE materials should foster awareness of the natural and built environments, an understanding of environmental concepts, conditions, and issues, and an awareness of the feelings, values, attitudes, and perceptions at the heart of environmental issues, as appropriate for different developmental levels.
- **Emphasis on skills-building:** EE materials should build lifelong skills that enable learners to address environmental issues and to prevent problems from arising.
- **Orientation to action:** EE materials should promote civic responsibility, encouraging learners to use their knowledge, personal skills, and assessments of environmental issues as a basis for environmental problem-solving and action.
- **Instructional soundness:** EE materials should rely on instructional techniques that create an effective learning environment.
- **Usability:** EE materials should be well designed and easy to use.

The NAAEE guidelines have been acknowledged and adopted by some 3,000 educators and organizations. They can comprise interdisciplinary, supportive benchmarks for all academic fields. These EE guidelines are supportive of most aspects of environment-based education. The guidelines also meet Goals 3, 4, and 5 (Student Achievement and Citizenship, Science and Math Primacy, and Adult Literacy and Life-Long Learning) of the National Education Goals Act through their attention to problem-solving abilities, application of knowledge, and written and oral communication (Simmons, 1995).

After-school programming involves more than just keeping young people off the streets. It provides opportunities for parent involvement, mentoring, community service, service learning, and independent, student-centered learning. The environment offers opportunities to strengthen after-school programming by involving a wide range of non-school, community-based resources that have enormous expertise and educational resources but that may be under-engaged in public education. These include parks and other public lands, nature centers, museums, zoos, aquariums and botanical gardens, among many others. Education may lie at the heart of their missions, but they — and the schools — often lack the resources to overcome obstacles such as transportation costs. With a requirement for community involvement and flexible use of funding, the 21st Century Community Learning Centers are facilitating these connections.

Examples of Environment-Based After-School Programs

EarthForce, Alexandria, Virginia — A program that involves middle school students in community projects to encourage volunteerism, community service and service learning.

EnvironMentors, Washington, DC — A program for inner city high school students that helps students work one-on-one with environmental professionals to improve skills used in environmental projects. The program focuses on populations where fewer than 25% of students graduate high school and go on to college. In last year's New Jersey EnvironMentors program, 12 of 14 graduating seniors planned to go to college.

Project Learning Tree, Project Wild, and Project WET, Washington DC, and Maryland — These three programs supplement teacher training programs that reach some 100,000 teachers and millions of students per year. They can easily be adapted to after-school programming for all ages.

Bringing the Watershed, Washington, DC— This public/private partnership gives high school students opportunities to study real-world science in the Washington, D.C. metropolitan area national parks. The Potomac and its watershed are the themes around which a multi-disciplinary high school science curriculum was created to enhance awareness and understanding in an after-school or out-of-classroom setting. The national parks are used as laboratories where students can apply science and math skills to real-world issues and cultivate a sense of stewardship for the nation's natural and cultural resources.

Bringing Education into the Afterschool Hours, Washington, DC — This program of the U.S. Department of Education is aimed at helping local after-school providers understand how to integrate content such as science, reading, math, technology, and the arts into their programs to enhance children's learning and build on regular school programs.

II. How Environment-Based Education Advances Learning Skills and Character Education

A. Developing Lifelong Learning Skills

With the national current focus on test scores and accountability, it is easy to overlook the importance of students learning how to learn. We will need an entire generation of effective learners if we are to successfully address the complex issues of the 21st century.

Learning skills are not a simple luxury. Worldwide, there are public and private institutions that strive to incorporate learning into every aspect of their activity in order to meet the challenges of fast-moving developments in culture, technology, and the environment. Becoming such a "learning organization" is now considered central to the successful future of all types of organizations. In their 1993 book, *The Learning Edge*, Wicke and Leon point out that learning and adapting are keys to individual success and program survival. The world is changing quite rapidly and we can expect this rate of change only to accelerate. Unless we prepare children to become their own teachers, they will not have the necessary skills to be successful adults. In *Fifth Discipline: the Art and Practice of the Learning Organization*, Senge notes that "real learning gets to the heart of what it means to be human. Through learning, we become able to do things we never could and to extend our capacity to be part of the generative process of life."

Are we creating a future generation of skilled learners? Many educators, political leaders and business executives are concerned that young people are learning too passively and are not becoming skilled learners in their own right. Here, environment-based education can offer real remedies and the enthusiastic participation of students.

EBE Offers the Basic Ingredients of Effective Learning

Effective Learning is Often Student-Directed

It is well established that young people learn best when they develop their own paths of discovery. Most good environment-based programs use investigative approaches and student-directed learning. Several studies indicate that focusing on student needs empowers learners and leads to greater overall achievement levels and higher self-esteem. Rainer and Guyton (1999) confirm the premise that teachers who encourage students to make choices about their learning see a positive attitudinal influence.

EBE Adapts to Different Learning Styles

Not all students learn in the same way. Some are readers, some listeners, and others can only absorb information and skills through active trial and error. Environment-based education programs can be adapted to different learning styles so that the student who learns by doing

can be as successful as the student who learns through lectures and books. In a 1994 article, "Learning Style Program Boosts Achievement and Test Scores," Klavas documents that teachers who changed instruction modes to match students' diverse learning styles often found that the students learned more and learned more easily.

Environmental educators often observe that students who fail in traditional school settings can succeed when the natural outdoor environment becomes the students' learning laboratory. Environmental educ ators believe that studying the environment furthers school reform objectives by making academic success an achievable goal for all students. In the 1999 inaugural issue of *EEducator,* NAAEE highlighted programs across the country that are strengthening their educational impact through environment-based education.

The Academic Process is Rigorous

Research on environment-based education confirms that it is academically rigorous and pays off in higher test scores. It ensures that students do not simply learn *about* science, they *perform* science (Kennedy, 1999). They identify practical and feasible solutions to environmental problems through research and experimentation. Finally, they implement their solutions working independently or in student teams.

"I take students to places where they can see evidence of [environmental] problems... I am inspired by their creativity and persistence in finding solutions."

— Kathleen McLean, Teacher, Great Falls Public School, Great Falls, Montana

Traditional instruction, such as lecturing, allows for broad content coverage, and there are times when it may be the most practical approach. But problem-based learning, a key aspect of environment-based education, increases conceptual understanding, retention, and self-directed learning (Leinhardt, Stainton, and Bausmith, 1998; Dods, 1997; Gallagher, 1997; Goodwin and Adkins, 1997).

B. Stronger Skills for the Workplace of the Future

In 1998, the Council on Competitiveness released a report, *Winning the Skills Race,* which found that the top concern of 60 percent of business leaders in America was finding skilled workers. This was twice the number who expressed concern just four years earlier in 1995. Although the shortage in skilled workers has diminished as the economy has slowed down, the availability of skilled workers remains an important concern. Fast-moving technologies continue to demand updated technical skills. Global competition has greatly intensified in recent years, increasing the premium for highly skilled employees. And as many employers will note, too many young people entering the workforce fall short of even minimal skills criteria.

A 1998 survey of adults in the State of Washington found widespread support for K-12 education that would do more to prepare young people for careers. Seventy-four percent of respondents agreed career skills necessary for the work place should be introduced to students before high school. Eighty-seven percent said that high schools should provide career preparation to every student before he or she graduates. Youths surveyed separately in Seattle in 1996 expressed similar widespread support for job-related experience connected to their educations.

How the Environment Prepares Students for Work

- Investigation and issue orientation
- Real world and complex problems
- Community projects and service learning
- Teamwork skills

School-to-Work and Community Service Skills

With the support of community leaders who seek to address society's need for school graduates ready to work and learn on the job, school-to-work programs have become much more popular in the past several years. The overall concept of school-to-work preparation has expanded beyond the notion of traditional vocational education.

Two aspects of environment-based education make it an appropriate and useful component of school-to-work programs. First, it is project-oriented and gives students the opportunity to see projects through from planning to implementation.

Second, environment-based learning can be highly oriented to community service. Many school-to work programs rely heavily on community service programs to help prepare students for careers. In a 1997 article, Bunderson and Cooper document that field-based EE helps students see the usefulness of what they are learning and often gives them insight into environmental careers.

Service learning also encourages teamwork. The complex work and technological projects of the future will require more effective team skills than may have been needed in the past. Learning to work as part of a team produces higher overall skills in students. In a 1998 article, "Constructing Maps Collaboratively," Leinhardt et al. note that students who worked together on map constructionn evidenced better understanding and competence than students who worked alone.

Environment-Based "Renaissance Workers"?

Society and business are calling for "renaissance workers"— employees who are leaders, visionaries, critical thinkers, skilled communicators, and collaborators. These people embody qualities of empowerment, self-discipline, flexibility, and ethical behavior (Gorman, 1999). They work independently as well as on teams; they must be able to create analytical reports, interpret data, and make decisions (Murphy, 1999).

Meeting 21st century environmental and economic challenges requires an understanding of the interdependence of the environment, the economy, communications, and technology. Government agencies and others responsible for natural resource management must operate with cutting-edge knowledge, sharing information and expertise, and managing knowledge in a way that integrates information from a broad range of fields. Those who operate in the new paradigm, using new technology to meet environmental and economic challenges, must have the requisite cognitive and scientific skills to manage the nation's natural resources effectively (PCAST, 1998; Conway, 1991).

Tomorrow's workers must also understand basic economic concepts and have finely tuned decision-making skills (VanFossen, 1999). They must be multi-skilled individuals who understand the value of "connected knowing," (e.g., understanding the complex interrelations among things). In a 1996 article, Installe explains that European engineering students are not well prepared to integrate socio-economic and environmental issues into their future professional activities. He argues in favor of a more interdisciplinary and systems-oriented approach to problems and better training in communication skills. Because environment-based education emphasizes multi- and interdisciplinary learning, higher-order thinking skills, and real world problem solving, it can help create the new generation of workers that tomorrow's economy needs.

Environment-based education gives students a chance to "try on" careers as they study real world issues and encounter community experts in various fields. These activities give students a realistic look at different kinds of work and the training and personal abilities required for each (Bunderson and Cooper, 1997). This learning connects to a workplace application and contributes to a student's sense of self-efficacy, a key factor in successful career development (Brown, 1999).

The environment as a discipline will play an important part in career development. Environmental technologies will become a routine business component in the future and will need to be integrated into ongoing business and engineering activities.

Washington State School-to-Work Education Requirements

Environment-based education programs provide students with opportunities to develop the skills that business leaders need. Washington State's School-to-Work academic requirements are an example:

- Read with comprehension, write with skill, and communicate effectively.
- Know and apply core concepts in math, social, physical and life sciences, civics and history, geography, arts, health, and fitness.
- Think analytically, logically and creatively and be able to solve problems.
- Understand the importance of work and how performance, effort, and decisions affect career opportunities.

C. Leadership and Character Development

Knowledge alone does not create leaders. According to Hungerford and Volk (1990), three conditions must exist in order for leadership skills to develop:

- sensitivity to an issue
- a sense of ownership
- a sense of empowerment

Students can change their behavior from passive to active by practicing leadership skills in their own communities and schools. Allowing students to confront public policy issues in the classroom empowers students and helps to promote effective and responsible citizenship

EE and Education for Leadership

EE Instructional Strategy	*How it Contributes to Leadership Skill*
Cooperative learning (working in teams or with partners)	Promotes inclusiveness, teamwork and acceptance of diversity of opinions
Critical thinking and discussion	Facilitates the change from passive to active learning (Chilcoat and Ligon, 1998); gets students involved
Hands-on activities	Encourages engagement and active participation
Emphasis on action strategies	Offers alternatives to problems and a sense of knowing how to make a difference in the world
Involvement in "real world", issue-based projects	Provides practice in taking the long-term view and opportunities to take action for the larger good; connects students with community

(Massialas, 1989). Issue-oriented approaches give students a better idea of the possibilities and constraints on citizen action, and about the roles and responsibilities of citizenship.

Leadership ability is built on many of the skills that environment-based education fosters: cooperation and the ability to act in appropriate, socially acceptable ways; letting all who want to be part of the action participate, either individually or as part of a team or group; showing concern for others; demonstrating active leadership and participation in the democratic process; and connecting to the community. In issues-oriented instruction, students are invited to actively solve problems, often connecting with the community in environmental service learning projects. Because it is inquiry-based (that is, learning and knowledge evolve from student questions and curiosity within a framework of agreed-upon academic standards), environment-based education is an excellent vehicle for helping students develop and practice the critical thinking and decision-making skills needed in the democratic process.

Examples of environment-based education programs that develop leadership skills include the following:

- **Adopt a Watershed, Hayfork, California** — This school program uses the subject of watershed conservation to develop a range of education skills. It includes a leadership skills training institute that emphasizes investigation and problem solving.
- **Penn State Conservation Leadership School, University Park, Pennsylvania** — Students come to Penn State University to study how resolving conservation issues produces leadership skills.

- **Catalina Leadership Program, Catalina, California** — Fourth to 12th graders attend Catalina's program to gain leadership skills in a natural setting, exploring the complexity of the natural world.
- **National Outdoor Leadership School, Lander, Wyoming** — Offers wilderness-based leadership training programs in Wyoming for 16- and 18- year-old students.

More information on these and other programs is available on NAAEE's EE-Link: Environmental Education on the Internet (www.eelink.net).

A Context for Character Building

"Environmental science informs students how to protect natural resources, gives them the tools they need to teach others, and serves to develop the next generation of land stewards."

— Michael J. Ferry, Teachers, Woonsocket High School, Woonsocket, Rhode Island

In its 2001 policy paper, *No Child Left Behind*, the Bush Administration discusses the importance of K-12 character education. Many people in this country are concerned that our young people are becoming more isolated, less respectful of others, and less willing to shoulder responsibility for themselves, their families, and their communities. Expressions of concern frequently come from professionals who daily deal with a breakdown in family social services, after-school crime, teenage pregnancies, drug use, and other problems. A countervailing social pressure is emphasizing the need for cooperation, diligence, a strong work ethic, and other similar character traits in order to maintain a vital and compassionate nation. At the same time, recent programs such as AmeriCorps have sparked an interest among young adults in volunteer contributions to society on an impressive scale.

While the complex process of building character in young people surely begins and ends in family relationships and parenting, recent findings indicate that schools also play an important role. Increasingly, schools are finding ways to share the important task of producing respectful, responsible adults.

In *Character Education in America's Schools* (Akin et al., 1999) the authors call upon schools to become more deliberate in character education by setting up instructional units that focus on activities involving cooperation and respect. Character education in schools grows out of a continuing series of useful interactions, not through passive, insular activities such as listening to a lecture.

Good schools serve as caring communities for children (Berman, 1996). They enjoy strong parent and community involvement in their programming and they stress respect, responsibility, and cooperation. Environment-based education programs provide ideal opportunities for creating such caring communities because they foster respect for the natural world.

Environment-based education can help teachers become character educators without being overly "preachy." The messages of environmental conservation — don't waste, take care, restore, respect the rights of others — are foundation blocks for building character education. Using the environment as an integrator offers a politically neutral but compelling avenue for implementing character education in the schools.

Develops Confidence and Higher Self Esteem

Youth who receive instruction in both environmental issues and action strategies assume personal responsibility for realizing their values. Such a sense of responsibility increases confidence and self-esteem. It also helps them feel part of "something larger than them" (Iozzi, Laveault, and Marcinkowski, 1990; Lieberman and Hoody, 1998).

"Few students realize that the choices they will make in their adult lives depend very heavily on basic precepts of science. My classes address real-life issues that they soon may face."

– Jenelle Hopkins, Teacher,
Centennial High School,
Las Vegas, Nevada

Students in some schools have been able to assist their communities with projects that would otherwise be too costly (National Association of Conservation Districts, 1998). For example, students enrolled at the School for Environmental Studies at the Minnesota Zoo in Apple Valley, Minnesota, completed a water quality study of the City of Eagan's 20 ponds. Community agencies used the students' data to improve city water quality.

Contrary to skeptical opinions that EE infuses students with a "gloom and doom" outlook, students who have increased knowledge about the causes of environmental problems are generally more positive about being able to correct and prevent future problems. They are also more confident about their own effectiveness in problem solving (Hoody, 1995; Champeau, 1997). Teens in the late 1990s exhibited rising optimism about their generation's ability to mobilize and lead society to overcome large-scale challenges affecting the future, including environmental issues. They believe that individual actions can make a difference (Carrier, 2000).

Self-empowerment can also lead to improved career outlooks. In a 1999 report, *Self-Efficacy Beliefs and Career Development*, Brown found such a correlation between student self-esteem and self-empowerment, and future career success.

III. CONCLUSION

A Dynamic Environment for Learning

Professionally-executed environmental education (EE) is a comprehensive process for helping people understand the environment, their place in it, and related issues. Environment-based education (EBE) uses the environment more broadly as a learning tool in schools and after-school programs. EBE employs a popular subject matter to improve student learning skills and to create a wider learning context for students, teachers, and the community. EBE emphasizes interdisciplinary integration of subject matter, problem- and issue-based learning experiences, team teaching, learner-centered instruction, constructivist approaches, and self-directed learning.

EBE helps teachers meet standards across multiple disciplines. Its emphasis on higher-order thinking increases academic achievement in language arts, math, science, social studies, and the arts. Its focus on the immediate environment and the local community makes learning relevant, interesting, and compelling. Students involved in EBE develop advanced lifelong learning skills, stronger workplace and community service and leadership skills, and develop confidence and higher self-esteem. Environment-based education enables teachers to produce environmentally literate young adults who are prepared to take their place in the complex and challenging society of the 21st century, and who can compete in a global economy with the skills, knowledge, and inclinations to make well-informed choices and exercise the rights and responsibilities of members of a community.

Broader adoption of environment-based education can help produce high-performance lifelong learners, effective future workers and problem solvers, thoughtful community leaders and participants, and people who care about the people, creatures, and places around them.

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Rainer, J. D. and E. M. Guyton. (1999). Democratic Practices in Teacher Education and the Elementary Classroom. *Teaching and Teacher Education,* 15(1), 121-32.
Teachers perceive that encouraging students to make choices about their learning exerts a positive influence on their attitudes about school and learning.

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Underlying constructivism is the recognition of the value of the learner as thinker. The ability to think, the authors say, is related to the ability to generate and consider important questions.

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Wild lands must be preserved for recreational use, the author says, and in order to ensure that the supply of wild lands continues to meet increasing demand, the education of professional outdoor leaders must include environmental activist skills, critical thinking skills, and environmental ethics.

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Examples of opportunities in environmentally related careers.

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Describes a transformation in attitudes and achievement that occurred at Hawley Elementary. Attributes some of the changes to the EE curriculum and the single-minded focus the faculty took toward raising student achievement.

VanFossen, P. J. (1999). *The National Voluntary Content Standards in Economics.* Bloomington, IN: ERIC Clearinghouse for Social Studies/Social Science Education. http://www.ed.gov/databases/ERIC_Digests/ed428031.html.
Contends that students need an economics-specific course to fully comprehend how the economy works, and that infusing economics into the curriculum may not be as educationally useful as studying economics directly.

Volk, T. and B. McBeth. (1998). *Environmental Literacy in the United States.* Rock Spring, GA: North American Association for Environmental Education.
Explores environmental literacy in the United States and summarizes the key thinking in the field. Suggests that community investigations, citizenship participation, and environmental studies courses are the most effective methods for achieving the desired state of environmental literacy in the U.S.

Vontz, T. S. and W. A. Nixon. (1999). *Issue-Centered Civics Education in Middle Schools.* Bloomington, IN: ERIC Clearinghouse for Social Studies/Social Science Education. http://www.ed.gov/databases/ERIC_Digests/ed429929.html.
Maintains that education for citizenship is a key task for public school classrooms and that students must address controversial issues in the classroom in order to learn how to think through, and respect divergent views on, issues they will have to face as adults.

Wisconsin Department of Natural Resources. (1994). *A Program to Promote the Learning of Hunting, Fishing, and Trapping Skills in Wisconsin.* http://ericae.net/ericdb/ED379125.htm
Contends that preserving wild lands for outdoor recreation requires support for instruction in scientifically sound resource management and use.

APPENDIX

Report Methodology

In October 1999, NAAEE conducted a preliminary survey of research abstracts to see if a case could be made that EE supports and sustains American values and benefits American youth. NAAEE believed that studying the environment enhances values such as:

- cooperation and inclusiveness
- optimism and a sense of the possible
- participation and team play
- concern for others
- academic success
- a healthy economy
- respect and appreciation for America's natural heritage

To explore these themes in the research literature, these values were linked to the more common educational terms of democratic education, character education, service learning, and problem-based learning. NAAEE searched *Education Abstracts* and *ERIC* by keying on those terms.

Results of the initial survey supported the hypothesis that EE benefits youth in profound and far-reaching ways. NAAEE deepened the original survey, researching *Education Abstracts* and *ERIC* using additional relevant key words such as: active learning, American values, beliefs about recreation, citizenship, community, constructivism, cooperative learning, critical thinking, diversity, environment and attitudes, EE and academic achievement, inquiry learning, life skills, optimism, problem solving, and teamwork. NAAEE also expanded the search to include the following databases and websites:

- Dissertation Abstracts
- Eisenhower Clearinghouse for Math and Science Education
- Higher Education Abstracts
- U.S. Department of Education, including the office of the National Assessment of Educational Progress (NAEP)
- U.S. Environmental Protection Agency (EPA)
- American Educational Research Association (AERA)
- State Environmental and Education Roundtable (SEER)
- 4-H Council
- American Society for Curriculum and Development (ASCD).

Abstracts and documents were obtained from websites and online databases, university libraries, and from the cooperating organizations themselves. In addition, approximately 400 individuals from the EE community were contacted to verify, as much as possible, that all existing and pertinent information was collected, particularly in the area of academic benefits. Results were reviewed, analyzed, and grouped according to the values to which EE contributed.

THE NORTH AMERICAN ASSOCIATION FOR ENVIRONMENTAL EDUCATION

The North American Association for Environmental Education (NAAEE) is a network of professionals, students, and volunteers working in the field of environmental education throughout North America and in over 55 countries around the world. Since 1971, the Association has promoted environmental education and supported the work of environmental educators. There are many environmental interest groups, and many organizations dedicated to improving education. NAAEE uniquely combines and integrates both of these perspectives, and takes a cooperative, nonconfrontational, scientifically-balanced approach to promoting education about environmental issues. NAAEE members believe education must go beyond consciousness-raising about these issues. It must prepare people to think together about the difficult decisions they have to make concerning environmental stewardship, and to work together to improve, and try to solve, environmental problems. NAAEE recognizes the need for a coherent body of information about environmental issues. Its members also recognize that information and analysis are only part of an effective education program. To be truly effective, this body of knowledge must be integrated into all aspects of the curriculum and into all types of educating institutions for the widest array of audiences. In order to translate theory into practice and to provide support for environmental education and educators, NAAEE offers a variety of programs and activities. These include NAAEE's Annual Conference, NAAEE publications and on-line services, and EE-Link.

THE NATIONAL ENVIRONMENTAL EDUCATION & TRAINING FOUNDATION

The National Environmental Education & Training Foundation is a private non-profit organization authorized by Congress in 1990. The Foundation strives to help America meet critical national challenges by connecting environmental learning to issues of national concern such as health care, educational excellence, business profitability, and effective community participation. NEETF awards leveraged challenge grants to outstanding environmental projects across the nation, and issues an annual NEETF/Roper Report Card on Environmental Attitudes, Knowledge, and Behaviors. In addition, NEETF seeks funds to support several innovative environmental education programs. Our work is organized into six programs:

- The **"ECO-Essentials" Program** is an exciting new effort to more effectively educate the adult population on environmental issues through the thoughtful use of television, radio, print media, and the Internet.
- The **National Partnership for Education and Environment** takes environmental learning into the mainstream of the K-12 education system, demonstrating how it produces high performance students and schools.
- The **EnvironMentors Project** matches adult mentors with students at under-resourced urban high schools.
- The **Health and Environment Partnership** aims to dramatically improve health care by better educating doctors and nurses on environmental risk factors.
- The **Green Business Network** is a "green" business website and community college-based training system that will put affordable, profit-making environmental practices into the hands of millions of small business owners.
- The **Environments-for-Learning Program** works to improve school environments, and to make America's public lands and nature centers more accessible to schools and teachers as tools of environmental education.

The North American Association for Environmental Education
410 Tarvin Road
Rock Spring, GA 30739
Tel: (706) 764-2926
Fax: (706) 764-2094
E-mail: email@naaee.org
Website: http://www.naaee.org

The National Environmental Education & Training Foundation
1707 H Street NW, Suite 900
Washington, DC 20006
Tel: (202) 261-6461
Fax: (202) 261-6464
Email: neetf@neetf.org
Website: http://www.neetf.org

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